

1. Two cars are competing in a race. Car A travels at 52 miles per hour and takes 12 minutes to complete the race. If Car B takes 16 minutes to complete the race, how fast was Car B traveling?

- A 25 miles per hour
☒ B 39 miles per hour
 C 50 miles per hour
 D 69 miles per hour

CAR B HAS A LOWER SPEED BY
 A FACTOR OF $\frac{16}{12}$ THAN CAR A

$$\frac{16}{12} = 1.33 \quad \frac{52}{1.33} \approx 39 \text{ mph}$$

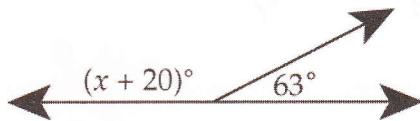
2. Twenty-five percent of the 1,236 ninth-grade students at East High School voted for Keyshaun for president of the ninth-grade class. About how many students did **not** vote for Keyshaun?

- A 300
☒ B 900
 C 1,200
 D 1,250

$$100\% - 25\% = 75\% \quad 75\% = 0.75$$

$$1236 \cdot 0.75 = 927 \approx 900$$

3. In the diagram below, find the value of x . (Note: The figure is not drawn to scale.)



- A 63
 B 83
☒ C 97
 D 117

$(x+20)^\circ$ AND 63° - SUPPLEMENTARY
 ANGLES (SUM = 180°)

$$x^\circ + 20^\circ + 63^\circ = 180^\circ$$

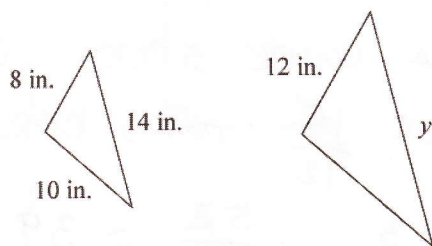
$$x + 83 = 180$$

$$\begin{array}{r} -83 \\ -83 \end{array}$$

$$x = 97^\circ$$

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4. The two triangles in the figure below are similar.



What is the length of the side labeled y?

A $9\frac{1}{3}$ in.

B $17\frac{1}{2}$ in.

C 18 in.

☒ D 21 in.

CORRESPONDING SIDES
ARE PROPORTIONAL

$$\frac{12}{8} = \frac{y}{14} ; 8y = 12 \cdot 14$$

$$\frac{8y}{8} = \frac{12 \cdot 14}{8} ; y = \frac{12 \cdot 14}{8} = 21$$

5. Which of the following best describes the pattern 1, 4, 16, 64, 256, ..., where n is any non-negative integer?

A $4n$

B 4^n

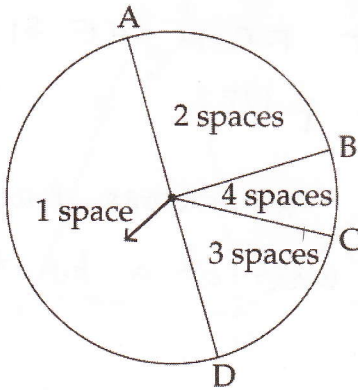
☒ C 4^{n-1}

D $\frac{n}{4}$

1	4	16	64	256
4^0	4^1	4^2	4^3	4^4

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6. A game of chance uses the spinner below. Each spin determines how many spaces a team moves forward. \overline{AD} is a diameter of the circle. If the sector representing a move of 2 spaces has a central angle of 90° and the sector representing a move of 4 spaces has a central angle of 30° , then what is the probability that a team moves exactly 3 spaces forward?



A $\frac{1}{12}$

B $\frac{1}{6}$

C $\frac{1}{4}$

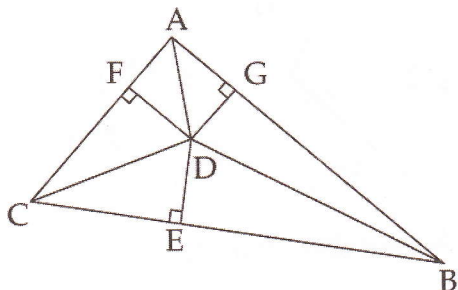
D $\frac{1}{3}$

semicircle
 \downarrow
 $180^\circ - (30^\circ + 90^\circ) = 60^\circ$
 $\uparrow \quad \uparrow$
 4 spaces 2 spaces

$\frac{60^\circ}{360^\circ} = \frac{1}{6}$
 \rightarrow
 ENTIRE CIRCLE

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7. \overline{DC} , \overline{DB} , and \overline{DA} are angle bisectors of $\triangle ABC$. Which word describes point D? (Note: The figure is not drawn to scale.)

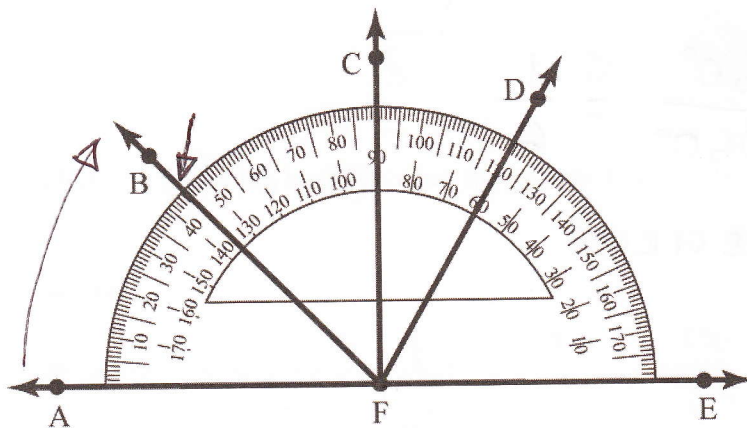


- A circumcenter
- B median
- ☒ C incenter
- D orthocenter

THE INCENTER OF A TRIANGLE
 IS EQUIDISTANT FROM THE SIDES
 C-13 p.178 -

THE 3 ANGLE BISECTORS ARE
 CONCURRENT (meet at a point)
 C-9 p.176

8. Look at this figure.

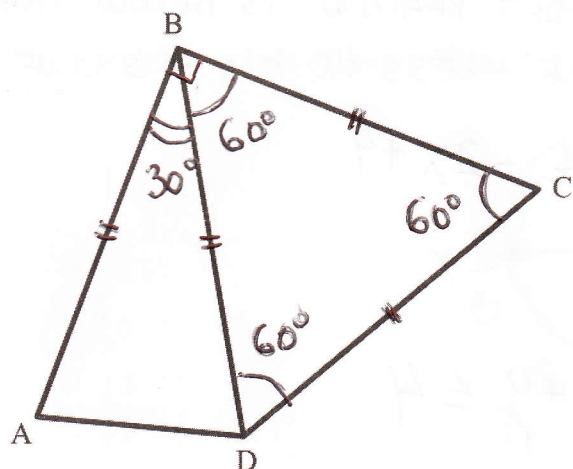


What is the measure of $\angle AFB$?

- A 135°
- B 60°
- ☒ C 45°
- D 120°

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9. Look at this compound figure consisting of an isosceles and an equilateral triangle.



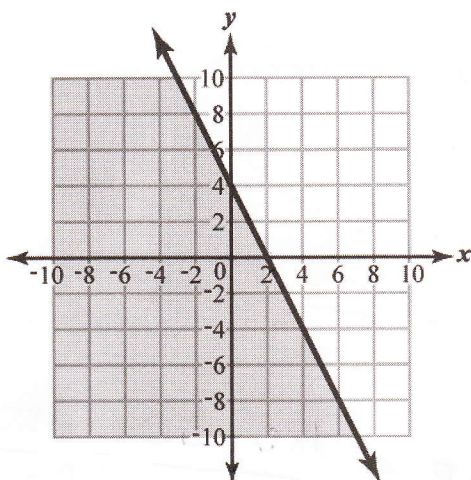
$$m \angle ADB = \frac{180^\circ - 30^\circ}{2} = \frac{150^\circ}{2} = 75^\circ$$

What is the measure of $\angle ADB$?

- ☒ A 75°
☐ B 60°
☐ C 45°
☐ D 135°

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10. Look at this linear inequality.



BOLD LINE: USE \leq OR \geq
SHADED REGION IS BELOW THE
BOLD LINE - LESS OR ON THIS LINE \leq

$$y \leq -2x + 4$$

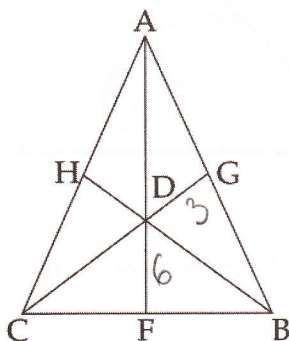
$$+2x \quad +2x$$

$$2x + y \leq 4$$

Which of the following inequalities does the graph represent?

- ☒ A $2x + y \leq 4$
☐ B $-2x + y \leq 4$
☐ C $-2x + y \geq 4$
☐ D $2x + y \leq -4$

11. What is the length of line segment \overline{AD} , given that D is the centroid, $DF = 6$ cm, and $DG = 3$ cm? (Note: The figure is not drawn to scale.)



- A 3 cm
B 6 cm
C 9 cm
☒ D 12 cm

CENTROID CONJECTURE C-15 p. 184

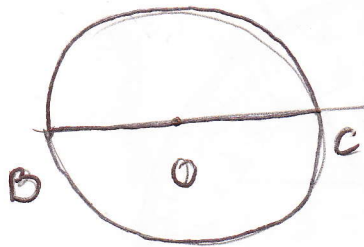
THE CENTROID OF A TRIANGLE DIVIDES
EACH MEDIAN INTO 2 PARTS SO THAT THE
DISTANCE FROM THE CENTROID TO THE
VERTEX IS TWICE THE DISTANCE FROM
THE CENTROID TO THE MIDPOINT OF THE
OPPOSITE SIDE.

$$DF = 6 \text{ cm}, AD = 2 \cdot DF = 2 \cdot 6 = 12 \text{ cm}$$

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12. The diameter of a circle extends from point $B(-3, 2)$ to point $C(3, -4)$. What point represents the center of the circle?

- A $\left(-\frac{1}{2}, -1\right)$
 B $(0, 0)$
 C $(0, -1)$
 D $\left(\frac{5}{2}, \frac{1}{2}\right)$



$$x_m = \frac{-3 + 3}{2} = 0$$

$$y_m = \frac{2 + -4}{2} = \frac{-2}{2} = -1$$

$(0, -1)$

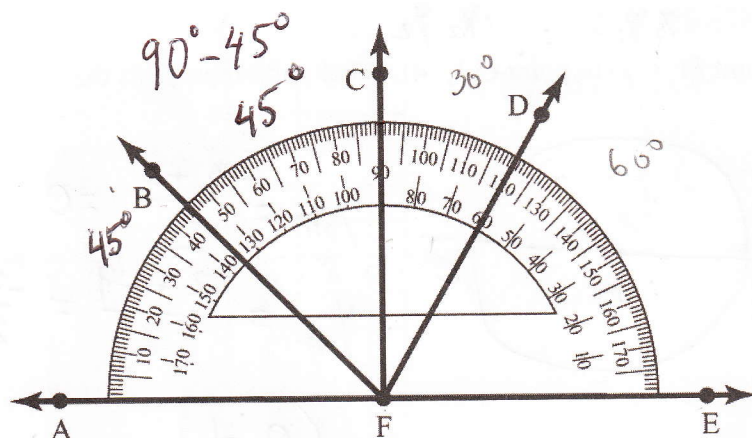
13. A box contains red and blue pencils. Two pencils are chosen without replacement. The probability of selecting a red pencil and then a blue pencil is 0.35, and the probability of the first pencil being red is 0.70. If the first pencil selected is red, what is the probability that the second pencil will be blue?

- A 0.20
 B 0.35
 C 0.50
 D 0.70

$$0.7 \cdot 0.5 = 0.35$$

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14. Look at this figure.

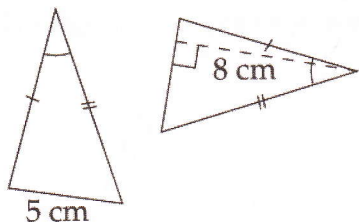


Based on the figure, which statement is true?

WE USED THE OUTSIDE SCALE

- ☐ A $\angle BFC \cong \angle EFD$
- ☒ B $\angle AFB \cong \angle BFC$
- ☐ C $\angle AFB \cong \angle DFC$
- ☐ D $\angle BFA \cong \angle DFE$

15. What is the total area of the two triangles shown below?



$$A_{\Delta} = \frac{b \cdot h}{2} = \frac{8 \cdot 4}{2} = 16 \text{ cm}^2$$

- ☐ A 20 cm^2
- ☐ B 26 cm^2
- ☒ C 40 cm^2
- ☐ D 80 cm^2

$$2A_{\Delta} = 2 \cdot 20 = 40 \text{ cm}^2$$

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16. What is the equation of the line that passes through $(-3, -2)$ and $(3, 4)$?

A $y = x + 7$

B $y = \frac{1}{3}x + 3$

☒ C $y = x + 1$

D $y = \frac{1}{3}x + 5$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - (-2)}{3 - (-3)} = \frac{4 + 2}{3 + 3} = 1$$

$$y = mx + b$$

$$y_2 = mx_2 + b$$

$$4 = 1 \cdot 3 + b$$

$$4 = 3 + b$$

$$-3 \quad -3$$

$$b = 1$$

$$y = mx + b$$

$$y = 1x + 1 = x + 1$$

OR PLUG IN THE
NUMBERS $x = 3$ $y = 4$

17. Given A $(0, -5)$, B $(-4, 8)$, and Q $(3, -1)$, which of the following locations for point P makes \overline{PQ} parallel to \overline{AB} ?

A $(-7, -12)$

B $(7, 12)$

C $(-1, 14)$

☒ D $(-1, 12)$

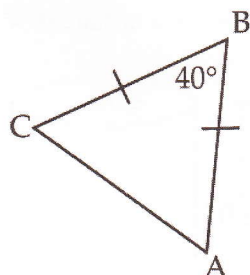
$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - (-5)}{-4 - 0} = \frac{13}{-4}$$

$$m' = \frac{y - (-1)}{x - 3} = \frac{y + 1}{x - 3}; \quad \frac{13}{-4} = \frac{y + 1}{x - 3}$$

$$y = 12 \quad x = -1$$

$$(-1, 12)$$

18. What is the measure of angle A? (Note: The figure is not drawn to scale.)



$$\angle C = \angle A$$

$$m\angle C = \frac{180^\circ - 40^\circ}{2} = \frac{140^\circ}{2} = 70^\circ$$

A 40°

☒ B 70°

C 110°

D 140°

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19. A number of households were surveyed to find the number of cars at each household. The table shows the results of the survey.

NUMBER OF CARS
 PER HOUSEHOLD

Number of Cars	Number of Households
0	III
1	IIII IIII
2	IIII IIII IIII
3	II
4	I

3
 9
 15
 2
 1
 30

TOTAL

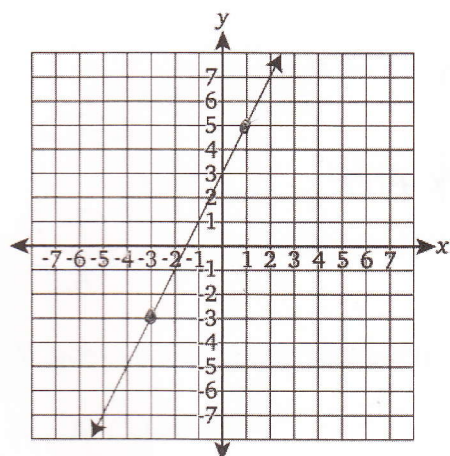
If 100 households are surveyed in the same neighborhood, which of these is a reasonable prediction of the number of households that will have 0 or 1 car?

- A 10
 B 35
 C 40
 D 30

$$12 \cdot \frac{100}{30} = \frac{1200}{30} = 40$$

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20. What is the equation of the line shown in the graph below?



$$y = mx + b$$

$$b = 3$$

$$m = \frac{8}{4} = 2$$

$$y = 2x + 3$$

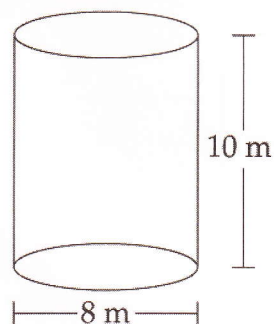
A $y = \frac{1}{2}x + 3$

B $y = 2x$

☒ C $y = 2x + 3$

D $y = \frac{1}{2}x - 3$

21. What is the volume of the cylinder below?



$$V = \pi R^2 \cdot h = \pi \cdot 4^2 \cdot 10 = 160\pi \text{ m}^3$$

A $40\pi \text{ m}^3$

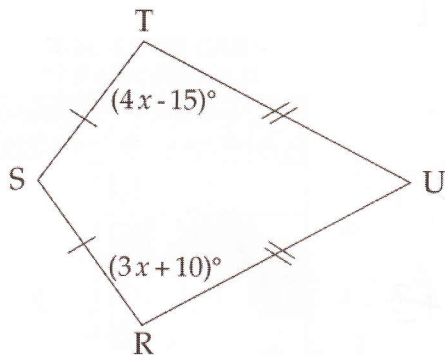
B $80\pi \text{ m}^3$

☒ C $160\pi \text{ m}^3$

D $640\pi \text{ m}^3$

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22. Quadrilateral RSTU is a kite. What is the value of x ?



$$4x - 15 = 3x + 10$$

$$x = 25^\circ$$

- A 20
☒ B 25
 C 75
 D 85

23. The length of a wall is 2 inches on a blueprint of a particular home. If the actual length of the wall in the home is 10 feet, how wide will a window in the home be if it measures 0.5 inches on the blueprint?

- ☒ A 2.5 feet
 B 30 feet
 C 10 feet
 D 4 feet

$$10\text{ft} = 10 \cdot 12 = 120\text{in}$$

$$\frac{120}{2} = 60$$

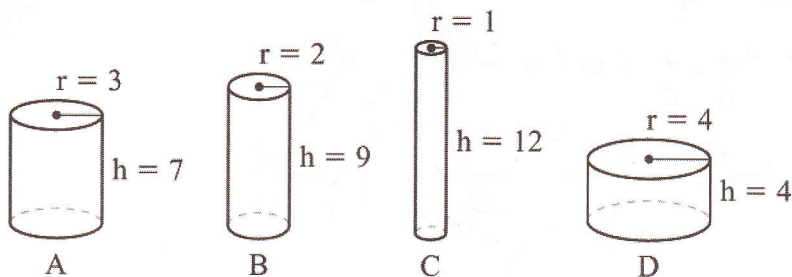
$$0.5 \cdot 60 = 30\text{in}$$

$$\frac{30}{12} = 2.5\text{ft}$$

$$1\text{ft} = 12\text{in}$$

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24. Look at these cylinders with their radii, r , and heights, h , given in centimeters.



Which cylinder has the greatest volume?

A Cylinder A

B Cylinder B

C Cylinder C

☒ D Cylinder D

$$V = \pi r^2 h$$

$$V_A = \pi \cdot 9 \cdot 7 = 63\pi$$

$$V_B = \pi \cdot 4 \cdot 9 = 36\pi$$

$$V_C = \pi \cdot 1 \cdot 12 = 12\pi$$

$$V_D = \pi \cdot 16 \cdot 4 = 64\pi$$

25. What is the midpoint of the segment with endpoints of $(-5, -2)$ and $(3, 7)$?

☒ A $\left(-1, \frac{5}{2}\right)$

B $\left(4, \frac{9}{2}\right)$

C $\left(1, \frac{1}{2}\right)$

D $\left(-4, -\frac{9}{2}\right)$

$$x_m = \frac{-5 + 3}{2} = \frac{-2}{2} = -1$$

$$y_m = \frac{-2 + 7}{2} = \frac{+5}{2} = 2.5$$

$$\left(-1, \frac{5}{2}\right)$$

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26. A line has a slope of 4 and passes through the point $(-2, 3)$. Which of the following is the equation for this line?

- A $y + 3 = 4x + 2$
 B $y + 3 = 4(x - 2)$
 C $y - 3 = 4x - 2$
 D $y - 3 = 4(x + 2)$

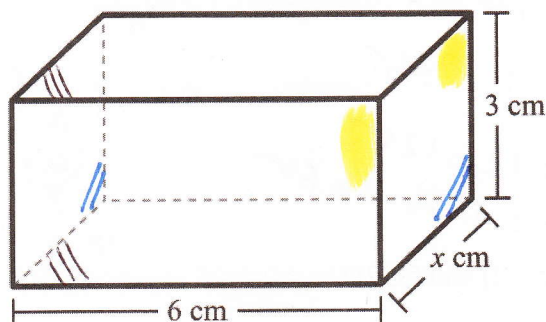
$$m = 4, \quad x_1 = -2, \quad y_1 = 3$$

$$y - y_1 = m(x - x_1)$$

$$y - 3 = 4(x - (-2))$$

$$y - 3 = 4(x + 2)$$

27. The total surface area of a rectangular prism is 108 square centimeters. The width and height of the prism are given in the figure.



$$6 \times 3 = 18$$

$$18 \cdot 2 = 36$$

What is the value of x , in centimeters?

- A 4
 B 4.24
 C 2.93
 D 6

2 SIDES
 ↓

$$6 \cdot 3 \cdot 2 = 36$$

$$6 \cdot x \cdot 2 = 12x$$

$$3 \cdot x \cdot 2 = 6x$$

$$108 = 36 + 12x + 6x$$

↑

TOTAL
SURFACE AREA

$$108 = 36 + 18x$$

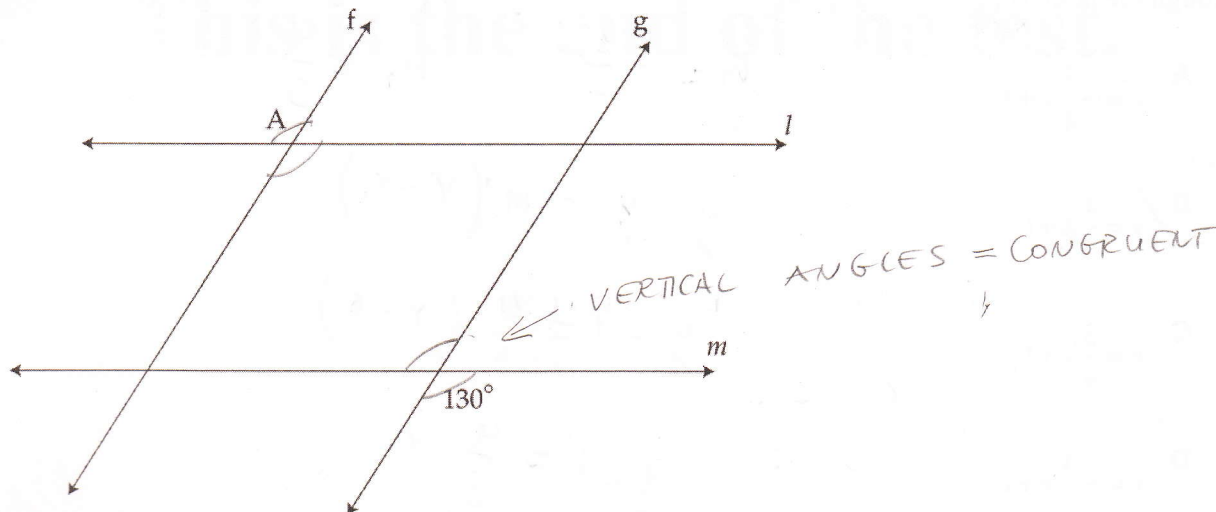
$$-36 \quad -36$$

$$\frac{72}{18} = \frac{18x}{18}$$

$$x = 4$$

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28. Line f is parallel to line g . Line l is parallel to line m . What is the measure of angle A ? (Note: Picture is not drawn to scale.)



- A 50°
- B 60°
- C 90°
- ☒ D 130°

29. The total surface area of a right cylinder is 12π square units. The height of the cylinder is 1 unit. What is the measure of the radius of the cylinder? —

- ☒ A 2 units
- B 4 units
- C 3 units
- D 6 units

$$2\pi R^2 + 2\pi R \cdot 1 = 12\pi$$

$$R^2 + R - 6 = 0$$

$$(R+3)(R-2) = 0$$

$$R_1 = -3$$

$$R_2 = 2$$

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30.

Which of the following is an equation of a line that is perpendicular to the line $y = -\frac{3}{4}x + 1$ and passes through the point $(0, 1)$?

A $y = -\frac{3}{4}x + 1$

B $y = \frac{4}{3}x + 1$

C $y = \frac{3}{4}x + 1$

D $y = -\frac{4}{3}x + 1$

$$m_1 = -\frac{3}{4} \quad m_2 = \frac{4}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 1 = \frac{4}{3}(x - 0)$$

$$y - 1 = \frac{4}{3}x$$

$$\frac{3y}{3} - \frac{3}{3} = \frac{4x}{3}$$

$$y - 1 = \frac{4}{3}x$$

$$y = \frac{4}{3}x + 1$$